

# Immediate Effects of Kinesio Taping on Lung Functions, Chest Expansion and Dyspnoea in COPD Patients

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## Abstract

**Background:** Dyspnoea is a major symptom of COPD and an independent predictor of mortality. It is caused by mechanical alterations adapted by shortened or deconditioned musculature. There is insufficient evidence regarding the efficacy of kinesio taping on the symptoms posed by respiratory conditions like COPD. This study investigates the immediate effects of kinesiology taping done for pectoralis major and rhomboid major, on chest expansion and lung functions along with dyspnoea. **Methodology:** By convenient sampling, 30 stable COPD patients with mild to moderate stage affection as per GOLD criteria, and having complaints of dyspnoea were randomly divided in two groups. Group A received kinesio taping along with conventional physiotherapy, group B was the control group where only conventional physiotherapy exercises were given twice a day for 3 days. Eligible patients were assessed for their lung functions, chest expansion and dyspnea. **Results:** Data analysis within the groups as well as between the groups was done using the WINPEPI and PRIMER software. Between groups comparison for lung functions showed significant improvement ( $p < 0.05$ ) for FEV<sub>1</sub>, FVC and PEF. Pre and post comparison of respiratory rate and SpO<sub>2</sub> between the groups showed significant improvement ( $p < 0.05$ ). **Conclusion:** There was a significant improvement in the experimental group which suggests that kinesio tape application is beneficial in improving lung function and reducing rate of perceived exertion.

**Keywords:** COPD, dyspnoea, kinesio taping, lung functions, oxygen saturation.

## Introduction

Chronic Obstructive Pulmonary Diseases (COPD) is a common condition encompassing patients having chronic bronchitis and emphysema<sup>1</sup>. It is many times also associated with Bronchial asthma. Dyspnoea has also been a frequent and major symptom of patients with COPD, and is an established independent predictor of mortality.<sup>2</sup> When dyspnoea starts interfering with daily physical activities, it results in significant reduction in physical activity. In COPD, the persisting breathing symptoms and airflow restrictions are because of

alterations in the respiratory system as a result of hyperinflation of sacs of the alveoli and subsequent destruction.<sup>2</sup>

The global disease burden of COPD is estimated to be 210 million population, as per data collected by the Global Initiative for Chronic Obstructive Lung Disease (GOLD).<sup>3</sup> Studies in India have reported the prevalence rate of COPD among smokers to be almost 44%.<sup>4</sup>

Kinesiotaping is an established effective intervention for peripheral nerve facilitation, muscle balance, and pain control.<sup>8</sup> Taping has been proved to be effective in improving oxygen levels and respiratory function in stroke patients.<sup>5,6,7</sup> However, a meta-analysis exploring the effectiveness of kinesiotaping concluded that there is not adequate evidence in support of Kinesio taping to enhance muscle activity.<sup>9</sup>

Kinesiotaping provides proprioceptive awareness over the area where it is applied. This will help normalise

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inappropriate muscle overactivity and re-educate the patient to adopt optimal body postures during work and daily activities.<sup>14</sup> Similarly, for the respiratory muscles, kinesiotaping is said to promote muscle activation and reduce abnormal muscle tension, subsequently leading to an increase in muscle strength. A previous study using kinesio tape applied on the chest of the healthy individuals during heavy exercise has shown augmented ventilator efficiency.<sup>5</sup>

There is limited literature available which explores the effect of kinesiotaping in patients with chronic respiratory diseases, specifically COPD. For these patients, kinesiotaping may enhance breathing efficiency by reducing the work of breathing.<sup>10</sup> When applied on the pectoralis major muscle from origin to insertion, inspiration will be facilitated, as the pectoralis major is an important accessory muscle for inspiration. This study investigates the immediate and short term effects of kinesiotaping on chest expansion and pulmonary function when applied to the pectoralis major and rhomboids.

### Methodology

After Institutional Ethical committee approval, 30 COPD patients with mild to moderate stage of COPD (according to GOLD classification)<sup>2</sup> having complaints of dyspnoea were enrolled after an informed consent. Patients were divided to two groups- group A which was the study group and kinesio tape application was done; group B being the control group where only conventional physiotherapy exercises with incentive spirometry were given for 3 days. Patients on oxygen therapy, having respiratory failure, ribcage deformities or fixed kyphosis, any postural deformity of spine, skin disease or allergies were excluded. Patients were assessed for pulmonary function and the 6 minute walk test was conducted. Kinesiotape was applied in an inhibitory method over Pectoralis Major and facilitatory method for rhomboid major muscles, as shown in figures 1 and 2 respectively.



Fig 1: Inhibitory kinesio taping for Pectoralis Major



Fig 2: Facilitatory kinesio taping for Rhomboid Major

Conventional breathing exercises including incentive spirometry was given twice a day for both groups. Immediately after the application of the kinesio tape and treatment, re-assessment was done for the experimental group to see the immediate effects. The interventions were carried for 3 days and kinesio tape was removed on 4<sup>th</sup> day. The outcome measures were reassessed.

### Results

Data analysis within and between the groups were done using WINPEPI and PRIMERS softwares. Normal distribution was calculated by WINPEPI applying the Shapiro-wilks test. The normally distributed values were analysed using t test. The data which were not distributed normally was analysed using Wilcoxon sum rank test. Significance was set at 95% confidence interval for the mean difference.

As seen in table 1 below, all values were statistically significant ( $p < 0.05$ ), except  $FEV_1/FVC$  ratio.

**Table 1: Comparison between the mean values and P value of both the groups on lung functions before and after treatment.**

Lung function	FVC		FEV <sub>1</sub>		FEV <sub>1</sub> /FVC		PEFR	
	EXP	CTRL	EXP	CTRL	EXP	CTRL	EXP	CTRL
Day 1 Pretreatment	60.2	58.6	41.7	50.07	40.4	83	42.9	65.6
Day 1 Immediate Post treatment	55.8		45.2		40.3		40.5	
Day 4 Post treatment	54.9	60.8	40.3	55.53	40.7	85.8	41.1	65.13
P value	0.01		0.02		0.38		0.004	

Table 2 below shows the pre and post treatment values for other outcome measures related to the 6 minute walk test and chest expansion. All values were statistically significant ( $p < 0.05$ ), except chest expansion at both levels.

**Table 2: Comparison of Mean values of other Outcome Measures for both groups before and after treatment.**

Outcome Measure	Experimental group		Control group		P value
	Pre	Post	Pre	Post	
Distance (m)	114	136	108	110	0
SpO <sub>2</sub> (%)	96.5	96.7	95.5	96.1	0
Respiratory rate (breath/min)	27.3	27.2	29.4	28.4	0.04
Borg score	3.3	3.06	3.3	3	0.03
Chest expansion- Axillary Level (cm)	2	1.8	2.2	1.8	0.16
Chest expansion- Nipple Level (cm)	1.4	2.1	2	2.1	0.06

## Discussion

This study was carried out to investigate the immediate effects of Kinesio taping as an adjunct to the conventional breathing exercises to relieve dyspnea and increase the chest expansion as well improving the lung functions in COPD patients. There are rare evidences available on the proprioceptive effects of Kinesio tape, especially in conditions with respiratory impairments.<sup>11</sup> This study incorporated the use of proprioceptive stimulation to the secondary respiratory muscles and the muscles responsible for increasing the chest expansion by means of structural variations and adaptation.

Results shows a significant difference in the mean value of lung functions in experimental group including the FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC and PEFR. No significant improvement was found in the FEV<sub>1</sub>/FVC ratio. The findings are similar to another study, which also additionally mentioned an increase in the oxygen saturation in patients with COPD after kinesio taping application after 24 hours of hospital admission.<sup>10</sup> Although the experimental group had a slight improvement in all the components, the mean differences between groups did not indicate major difference of any one intervention over the other.

The distance covered in the 6 minute walk test was significantly different in the experimental group ( $p < 0.05$ ), but not in the control group. But when the mean differences among both groups were compared the difference was statistically significant ( $p < 0.05$ ). This may be due to the fact that there was reduced dyspnoea and better  $O_2$  saturation. As a result the patient could cover more distance without difficulty.

There was no statistical difference ( $P = 0.08$ ) seen in the  $SPO_2$  values for experimental group. The short duration of treatment could be the possible reason for no significant effects as it requires adequate duration for changes occurring at cellular level and affecting the aerobic capacity.<sup>12</sup> Whereas the control group showed significant difference ( $P = 0.01$ ) in the  $SPO_2$ .

There was significant difference noted on the BORG score of both the groups, when compared within the group as well as between the groups ( $p < 0.05$ ). These findings are similar to a previous study, which showed that the level of exertional dyspnoea significantly improved in the experimental group.<sup>13</sup>

Literature mentions that Kinesio taping enhances cutaneous stimulation of the mechanoreceptors, relieves pain, assists postural alignment and increases muscle bioelectric activity.<sup>12</sup> Another reason for the improvement in the experimental group may be the proprioceptive awareness because of the presence of the tape over the chest, also providing a visual and tactile stimulus for effective breathing rate and pattern, leading to better  $O_2$  saturation level.<sup>14,15</sup>

### Conclusion

From this study, it can be concluded that application of kinesio tape can be an adjunct to conventional breathing exercises for COPD patients. There is improved lung function and reduced rate of perceived exertion after application of kinesio tape.

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**Source of Funding:** Nil

**Ethical Clearance:** Taken from Institutional Sub-Ethics Committee of Dr. D. Y. Patil College of Physiotherapy, Pune.

### References

1. Porter S. Tidy's Physiotherapy E-Book. Elsevier Health Sciences; 2013.
2. Global Strategy for the diagnosis, management, and prevention of Chronic Obstructive Pulmonary Disease 2019 report. Global initiative for chronic obstructive lung disease (GOLD). Available online from: <https://goldcopd.org/wp-content/uploads/2018/11/GOLD-2019-v1.7-FINAL-14Nov2018-WMS.pdf> [Last accessed on 10 May 2019].
3. Lorbergs AL, O'Connor GT, Zhou Y, Trivison TG, Kiel DP, Cupples LA, Rosen H, Samelson EJ. Severity of kyphosis and decline in lung function: the Framingham study. *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences*. 2016 Jun 24;72(5):689-94.
4. Mahmood T, Singh RK, Kant S, Shukla AD, Chandra A, Srivastava RK. Prevalence and etiological profile of chronic obstructive pulmonary disease in nonsmokers. *Lung India: official organ of Indian Chest Society*. 2017 Mar;34(2):122.
5. Ora J, Calzetta L, Pezzuto G, Senis L, Paone G, Mari A, Portalone S, Rogliani P, Puxeddu E, Saltini C. A 6MWT index to predict  $O_2$  flow correcting exercise induced  $SpO_2$  desaturation in ILD. *Respiratory medicine*. 2013 Dec 1;107(12):2014-21.
6. Park SJ: The effects of rib cage joint mobilization and threshold inspiratory muscle training applying respiratory function and respiratory activation of stroke patients, Yong-in University Graduate School of Rehabilitation and Welfare, a Master's degree, 2016.
7. Lee MH, Hwangbo G: Effects of the neck stabilizing exercise combined with the respiratory re-education exercise on deep neck flexor thickness, forced vital capacity and peak cough flow in patients with stroke. *PhysTher Korea*, 2015, 22: 19-29.
8. Seo KC, Lee HM, Kim HA. The effects of combination of inspiratory diaphragm exercise and expiratory pursed-lip breathing exercise on pulmonary functions of stroke patients. *Journal of Physical Therapy Science*. 2013 Mar 25;25(3):241-4.
9. Langendoen J, Sertel K. Kinesiology taping: the essential step-by-step guide: taping for sports, fitness & daily life: 160 conditions & ailments.

- Robert Rose Incorporated; 2014.
10. Daitx RB, dos Santos K, Dohnert MB, da Silva TD, Silva JD. Limited utility of Kinesio Taping® in the physiotherapy treatment for patients with chronic obstructive pulmonary disease exacerbation. *Physiotherapy theory and practice*. 2018 Oct 3;34(10):741-6.
  11. Williams S, Whatman C, Hume PA, Sheerin K. Kinesio taping in treatment and prevention of sports injuries. *Sports medicine*. 2012 Feb 1;42(2):153-64.
  12. Saniye AA, Arzu D, Nihan OP, Elfin S. The effects of kinesio taping applied to diaphragm muscle on aerobic exercise capacity and pulmonary function in sedentary individuals. *Anatolian Clinic the Journal of Medical Sciences*. 2018 May 23(2): 68-72. <https://doi.org/10.21673/anadoluklin.385414>
  13. Mehta GP, Babu VK, Akalwadi A, Kumar SN. Combined effect of PNF stretching with chest mobility exercises on chest expansion and pulmonary functions for elderly. *International journal of physiotherapy*. 2015 Jun 1;2(3):563-71.
  14. Serrão JC, Mezêncio B, Claudino JG, Soncin R, Miyashiro PL, Sousa EP, Borges E, Zanetti V, Phillip I, Mochizuki L, Amadio AC. Effect of 3 different applications of Kinesio Taping Denko® on electromyographic activity: inhibition or facilitation of the quadriceps of males during squat Exercise. *Journal of sports science & medicine*. 2016 Sep;15(3):403.
  15. Kase K. Clinical therapeutic applications of the Kinesio taping method. Albuquerque. 2003.